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EARLY MAN IN AMERICA.

WHO were the earliest inhabitants of America, and when did they live? are questions which have generally been approached solely from the point of view offered by discoveries in the United States, and, until within the last three or four years, have been discussed only on the slender basis of the Calaveras skull and the implements found in gold-mining in California. In the following essay I propose to deal with them as portions of one great problem common to the Old and New Worlds, and to show that the first traces of man, as yet discovered, prove him to have lived in the same low stage of culture on both sides of the Atlantic, at a time when the hands of the geological clock pointed to the same hour over the greater part of the world. The story of early man in America is a part of the greater story of the first appearance of man on the earth, so far as he has yet been revealed by modern discovery.

Before we enter into these questions, we must define clearly what is meant by the geological clock. In dealing with events recorded in documents, we not only know the relation of one event to another, and how long an event was in coming to pass, but we can accurately measure the intervals in terms of years. This obviously cannot be done without chronicles of some sort or another. In the great geological past outside history, we have no such evidence of the flow of the years, and we can only arrange our events in due relation to each other, without knowledge either of the length of time necessary for each, or of the length of any of the intervals. Consequently we cannot fix a date, in the historical sense, for events which happened outside history, and cannot measure the antiquity of man in terms of years. The present rate of the retrocession of the Falls of Niagara, or of the deposit of Nile mud, or of stalagmite in caverns, or of the accumulation of the rocks themselves, or of the movement of glaciers, have been vainly used as natural chronometers, on the assumption that they have been going on at the same rate through all the past, and have been warranted never to stop, or to want winding up, or to go faster or slower than at the moment the observer was looking at them. Such attempts are so obviously futile that it is not a little strange to find them seriously made by men like Wallace and Mortillet. The antiquity of man is to be measured simply by an appeal to the succession of events in the geological record, by the changes in the face of nature, in climate, in geography, and in the forms of life.

The change in life has been so regular, definite, and orderly in the geological past, that it enables us to classify the rocks over the whole world into Primary, Secondary, and Tertiary groups. In the last of these, the higher types of Mammalia become more and more specialized as we draw nearer to the frontiers of history; and their pedigrees, when traced from one period to another, assume the shape of genealogical trees, such as that which Professor Marsh has discovered for the horse. The living orders first appear in the Eocene, the living genera in the Miocene, a few living species in the Pliocene, while nearly all the living species come in in the Pleistocene division. Again, in the interval dividing the last from the Historic period, the domestic animals appear and the cultivated fruits, and this—the Prehistoric—gradually passes into the period embraced by the written records. The succession of events may be used as the figures on our dial-plate, marking the lapse of geological time in the Tertiary period, as follows: (1.) The Eocene period, in which the placental mammals now on the earth were represented by extinct allied forms belonging to existing families and orders. The order Primates, to which man belongs, is represented by creatures allied to the lemurs both in the Old and New Worlds. (2.) The Miocene, in which the alliance between living and extinct mammals is more close, and living genera appear. The Primates are represented by a higher division, the family of apes, in Europe and in the United States. (3.) The Pliocene, in which, for the first time, living mammalian species appear; but they are few in number compared with the extinct species. (4.) The Pleistocene, in which the living species are more abundant than the extinct among the Mammalia, and the Primates are represented by their highest development, the family of man.

(5.) The Prehistoric, characterized by the present fauna and flora, being in possession of the regions in which they have been known historically. Man has increased and multiplied on the earth, and is possessed of domesticated animals and cultivated fruits, and has acquired the arts of spinning, weaving, mining, and pottery making in the Old World, and gradually passed through the Neolithic, Bronze and Iron stages of civilization. (6.) The Historic, or period covered by written records, which varies in each country, going back to 4000 B. C. in Egypt, and in America to the time of Christopher Columbus. Were the extinct species taken into account, it would be seen that they fill up the interval separating one living form from another, and that they approximate to living species as they approach nearer to the present time.

It will be seen from the examination of the above periods that the inquiry into the antiquity of man is limited to the last four. The most highly specialized form in the animal kingdom cannot be looked for until the lower animals by which he is now surrounded made their appearance. We cannot imagine him to have been living in the Eocene age, when animal life was not sufficiently differentiated to present us with living genera of placental mammals. Nor is there any probability of his having appeared on the earth in the Miocene, because of the absence of placental mammals belonging to living species. It is most unlikely that man should appear in a fauna in which there was no other living mammal. He belongs to a more advanced stage of evolution than that presented by the mid-Miocene of Thenay, in which flint splinters fashioned by man are said to have occurred. Up to this time, the evolution of the animal kingdom had advanced no farther than the *Simiadæ* in the direction of man, and the apes then haunting the forests of Italy, France, and Germany were the most highly organized types. We may also look at the question from another point of view. If man were upon the earth in the Miocene age, it is incredible that he should not have become something else while those changes were going on in the conditions of life by which all the Miocene land mammalia have been so profoundly affected that they have either assumed new forms or been exterminated. It is impossible to believe that man should have been an exception to the law of change. Nor in the succeeding Pliocene age can we expect to find traces of man upon the earth. The living placental mammals had only then begun to appear, and seeing that the higher animals have invariably appeared in the rocks according to their place in the zoölogical scale, Fishes, Amphibians, Reptiles, Placental Mammals, it is hardly reasonable to suppose that the highest of all should then have been upon the earth. The few scored bones in the Pliocene strata of Italy, referred by Prof. Capelini to the work of Pliocene man, are considered by Evans and Mortillet to have been marked by the teeth of the large sharks abundant in those seas. And if they be artificial it is not, in my opinion, proved that they were marked in the Pliocene age. "The fossil man of Denise" is of uncertain age, and other alleged cases of Pliocene man in Europe have now been given up.

The question has however been revived in the United States by Prof. Whitney, in his work on the Auriferous Gravels of California, and the existence of man in California, in the Pliocene age, has been accepted by such high authorities as Marsh, Le Conte, and others. It becomes, therefore, necessary for us to see how the facts will stand the test of criticism. In the first place, it is assumed that the auriferous gravels in the Sierras, with traces of man, which are in some places three hundred feet thick, and sometimes covered with ancient lava streams, are of Pliocene age. They are, however, proved by their fossils, identified by Dr. Leidy, to have been deposited by the streams from the Miocene (*Elotherium*) age down to the present time. Among the animals we may note the skull of a mustang, identical with that of Mexico and California, which could not have been buried in the gravels of Sierra County before the time of the Spanish conquest, when the living race of horses was introduced. Consequently, the discovery of human remains in the auriferous gravels does not prove that man was an inhabitant of Pliocene America, even if it be allowed that they are of the same age as the strata in which they lie. There is, however, no evidence of this in any one instance. The objects themselves point to a directly opposite conclusion. The stone mortars, pestles, polished stone axes, beads, etc., found at various depths, are identical with those scattered over the surface, and used by the Indian tribes of California, described by Bancroft in his "Native Races of the Pacific States," and more recently by various writers in the seventh volume of the United States Geographical Survey under the direction of Captain Wheeler. The human bones are indistinguishable from those of the Red Indians. The famous Calaveras skull, according to Prof. Wyman, is related to the Indian type, with a doubtful affinity with the Eskimos. It was obtained from a shaft sunk through three alternate layers of gravel and basalt, at a depth of one hundred and thirty-two feet from the surface, was associated with the remains of other individuals, and had been buried along with shell-beads of the kind usually met with in Indian interments. Had these remains been found near the surface they would have been undoubtedly classified with the ordinary traces of Indians, and their occurrence at so great a depth is the sole cause of their being the object of special interest.

Nor have we to go far to account for their presence at great depths. It is very strange that Prof. Whitney should have ignored the fact that mining operations have been carried on in those very districts long before the time of "the forties." "In 1849," writes Schoolcraft ("Archæology," vol. i., p. 105), "the gold-diggers at one of the mountain diggings, called Murphy's, were surprised, in examining a high, barren district of mountain, to find an old site of a mine, with a shaft two hundred and ten feet deep, at the bottom of which were a human skeleton, an 'altar,' and other remains of an ancient people,—probably Indian." In other ancient mines in the Western States, as Dr. Southall has recently pointed out, human skeletons have been met with, which prove that gold mining was extensively carried on long before the discovery of gold in the present century. The whole group of human remains, therefore, in the auriferous deposits, instead of proving the existence of Red Indians in California in the Pliocene age, belong to a comparatively modern period. Some are probably the results of interments which took place in deep mines or in superficial deposits, while others have found their way by accident into the auriferous gravels from the surface at various times. The famous ode of Bret Harte, in which he humorously puts down the Calaveras skull to a miner from Missouri,—"But I'd take it kindly if you'd send the pieces home to old Missouri,"—is true so far as the mining is concerned, and M. Simonin was not so wide of the mark as appears at first sight, when he seriously followed Mr. Bret Harte in ascribing, in the "Revue des Deux Mondes," the "Pliocene skull" to "*un mineur Missourien.*" The remains, looked at purely from the archæological point of view, are Neolithic, and identical with those which unmistakably belong to the ancient Indian tribes of North America. We cannot seriously entertain the idea that mankind first appeared on the earth in the Neolithic stage of culture, identical, so far as we know, in every respect with the ancestors of the present Red Indians, at a time when there were but few living species of the higher mammalia, and that he lived in California before cañons from two to three thousand feet had been cut by the existing streams out of the solid rock. Neither in the New nor in the Old World is there any trace of Pliocene man revealed by modern discovery.

We come now in our inquiry to the succeeding period, when the higher Mammalia, now contemporary with man, appeared in force on the earth, and man himself may be reasonably looked for. We will take the point of view, first of all, offered by Europe. The Pleistocene, or Quaternary, period in Europe is characterized by the arrival of numerous living species, which are divisible into four natural groups, according to their present *habitats*. To the first belong those now living in the temperate zone in the northern hemisphere, such as the mole, musk-shrew, beaver, lynx, wild-cat, wolf, fox, martin, ermine, stoat, otter, brown and grizzly bear, horse, bison, urus, saiga antelope, stag, roe, fallow-deer, and wild boar. They emigrated from Asia, and some pushed their way as far south as northern Africa. The second consists of arctic animals, such as the arctic hare and lemming, musk-sheep, reindeer, and wolverine. These animals also came from Asia, and found their way as far to the south as the Alps and Pyrenees, and as far to the west as Ireland. The third group is composed of those animals now enjoying the cold climate of high altitudes in Europe, such as the chamois, ibex, and Alpine marmot. The fourth is represented by animals now only found in warm countries, such as the lion, panther, African lynx, spotted and striped hyena, hippopotamus, and African elephant and porcupine. The remains of these animals lie scattered over southern Europe, and as far to the north as Yorkshire, and to the west as Ireland. With these, certain extinct species appear, hitherto unknown, such as the straight-tusked elephant, mammoth, pigmy elephant, woolly and small-nosed rhinoceroses, the Irish elk, pigmy hippopotamus, and the cave bear. The distribution of these animals throws a flood of light on the geography and climate of Pleistocene Europe. The British Isles, at the time of their migration, must have formed part of the continent, and the evidence is tolerably clear that the hundred fathom line off the west coast of Ireland was then the Atlantic coast line. The area of the North Sea was a broad, open valley, gashed by a deep fjord extending close to Norway and as far as Denmark. The Mediterranean occupied a much smaller area than it does now, and was isolated from the Atlantic by a land barrier, extending in the direction of the Straits of Gibraltar, along which the animals could migrate freely between Spain and northern Africa. It was also cut into two deep basins by a neck of land extending northward from Cape Bon, by way of Malta and Sicily, along which the animals, now found in the bone caves and river deposits of those regions, could freely pass. To account, indeed, for the distribution of animals in the islands, we must believe that, in those days, the Mediterranean area was elevated about 2400 feet above its present level, a change which would unite Corsica and Sardinia to France, turn the Adriatic into a broad valley, and elevate the islands of the Greek Archipelago into mountain peaks.

The climate of Europe at this time differed considerably from that of the present day. To allow of the northern animals penetrating as far south as the Alps and Pyrenees, the temperature in middle Europe must have been low, while it must have been high for animals of warm habits, such as the hippopotamus, to have lived as far north as the British Isles. The remains of both these groups are so intermingled in the river deposits and caves throughout middle Europe—hippopotamus with reindeer and the like—that it is impossible to refer them to periods separated from each other by long intervals. In most of the caves the gnawed remains prove that the reindeer formed a large part of the prey of the spotted hyena. The solution of this difficulty lies in the fact that Europe was then a large tract of land, reaching from northern Africa far into the Atlantic, and therefore enjoyed a continental climate, with the summer heat greater than now, and the winter cold more severe. But this only disposes of one part of the difficulty, for it is not likely that the animals would swing to and fro over such a wide area as that reaching from the Pyrenees to the Baltic in one season. There must, therefore, have been some other cause at work, and that cause is distinctly shown, by the ice marks scattered far and wide over the flanks of the mountains of central and southern Europe and over the low-lying districts in the north, to have been a secular and gradual lowering of temperature, until it reached its minimum, probably with long pauses and possibly with the return of warmer conditions. Owing to these climatal changes every inch of ground, in middle and western Europe, would successively form a frontier between the northern and southern animals, and their remains would be mingled together as we find them to be. During the extreme cold, the arctic animals would arrive at their southern limit. Closely following on this lowering of the temperature to its minimum, geographical changes of great magnitude took place in the north of Europe. The area to the north of the line passing from the lower valley of the Severn eastward into Russia was depressed beneath the waves of a berg-laden sea, and again lifted up so that the British Isles, then an archipelago, again formed part of the main-land. As the land emerged from the water, the Pleistocene forests crept over it, and the animals found their way over the southern and midland counties.

Such as this was the scene on which man first appears in Europe. Rude splinters of stone, and roughly chipped pebbles of flint and chert, at their very best trimmed to an almond shape, and mostly intended for use in the hand, occur abundantly in the river deposits of England and France, in association with the remains of the above animals. They are the implements of savages living by the chase, and probably also by fishing and fowling. Not only have the implements been discovered, but the very spots on the river-bank where the hunter sat and made them have been identified, as at Crayford and other places in the valley of the Thames. Could we have penetrated to the banks of the Thames, or of the Seine, in those times, guided by a thin column of smoke rising over the trees till we reached the camp of the river-drift hunter, we might have seen the men selecting blocks of flint and chipping their implements out of them, the women preparing the half raw meal of flesh, it may be of reindeer, mammoth, or rhinoceros, while the children broke the silence of the evening with their shouts on those very spots where are now to be heard, day and night, the voices of London and Paris.

Nor can there be much doubt as to the relation of the river-drift hunter to the above-mentioned changes in climate and geography, which are usually summed up under the term Glacial. The balance of evidence is in favor of the view that the hunter at Crayford was in the valley of the Thames before the submergence, and before the temperature had reached its minimum, or in other words, in Preglacial times. The river-drift hunter whose implements are left at Abbeville traversed the shore of a berg-laden sea, and possibly may have inherited a tradition from his ancestors of the famous hunting-grounds then lying at the bottom of the British Channel and the great Northern Ocean. The hunter who followed the hippopotamus and the reindeer in the valley of the Ouse, near Bedford, was there after the reëlevation of the land and the cutting of the valley through the mantle of bowlder clay which had been dropped from the melting bergs. He probably went far enough northward to see the glaciers then crowning the Pennine chain and the mountainous regions of Wales.

Southward, the river-drift man wandered far and wide over France, hunting the same animals in the valleys of the Rhone, Loire, and Garonne as in the valley of the Thames. In the Iberian peninsula he was a contemporary of the African elephant, the mammoth, and the straight-tusked elephant, and he camped in the neighborhood both of Lisbon and Madrid, showing here, as in France and Britain, singular facility in choosing places, which became, in the long ages which were to follow, the sites of great capitals. He also ranged over Italy, leaving his implements behind in the Abruzzo; and in Greece, in the neighborhood of Corinth, he was familiar with the extinct pigmy hippopotamus. We can also track him south of the Mediterranean by the implements found in Oran, and near Kolea in Algeria, in the Sahara, and in several places in Egypt. At Luxor, they have been discovered by General Pitt Rivers in the breccia, out of which are hewn the tombs of the Egyptian kings. In Palestine, they have been obtained by the Abbé Richard between Mount Tabor and the Sea of Tiberias, and by Mr. Stopes between Jerusalem and Bethlehem. Throughout this wide area the implements are of the same rude type, and generally of the same materials, flint or quartzite, those of Luxor and Palestine being identical with those in the river valleys of Britain and of France. Throughout this area, too, the river-drift man hunted some or other of those animals which we have mentioned above.

Nor is our survey yet ended. He is proved by many discoveries to have ranged over the Indian peninsula, from the valley of the Nerbudda in the north as far as Madras. Here we find him forming part of a fauna in which are to be numbered species now living in India, such as the Indian rhinoceros and the arnee, as well as extinct types of oxen and elephants. There were two extinct hippopotami in the rivers, as well as living gavials, turtles, and tortoises. It is plain, therefore, that at this time the higher mammals of India stood in the same relation to the present Indian animals as the European fauna of the Pleistocene does to that now living in Europe. In both there was a similar association of living with extinct forms, and in both the central figure is the river-drift hunter.

We are led from the region of tropical India to the banks of the Delaware in New Jersey, by the recent discoveries of Dr. Abbott, in the neighborhood of Trenton, which I have had the opportunity of examining with that gentleman and Professors Haynes and Lewis. The implements are of the same type, and occur under exactly the same conditions, as the river-drift implements of Europe. They are found in a terrace of river gravel and loam overlooking the river, and are composed of materials derived from the old terminal moraine which strikes across the States of New Jersey and Pennsylvania in the direction of Lake Erie. The large blocks of stone which it contains indicate that during the time of its accumulation there were ice rafts floating down the Delaware in the spring, as in the Thames, the Seine, and the Somme in those days. According to Professor Lewis, it was formed either during the time when the glacier of the Delaware was retreating ("Late Glacial") or a later period ("Post-Glacial"). The physical evidence is clear that it belongs to the same age as the deposits with similar remains in Europe. The fossil animals—the reindeer, bison, and mastodon—found in it also point to the same conclusion. These animals belong to a fauna occurring in fluviatile deposits in North America, composed of the same elements, and even some of the same species (as may be seen in Dr. Leidy's lists) as that of the Pleistocenes of Europe. In it living and extinct forms, and those now found in warm and cold regions, were mingled together. To the temperate division belong the Virginian deer, the bison, raccoon, and the stag, the beaver and the elk; to the northern, the reindeer and musk-sheep; to the southern, the tapir and peccary. Among the extinct species we may note the American variety of the mammoth, the mastodon, and the great sloths—*Megatherium*, *Megalonyx*, and *Mylodon*, as well as a species of capybara and of musk-sheep. The *Felis atrox* of Dr. Leidy I am unable to distinguish from the cave-lion of Europe. All these animals were probably familiar to the river-drift hunter as he passed northward to the edge of the great glacier, or southward into the tropics of Central America. He was encamped at Trenton either while New York lay buried under the ice—which has left its unmistakable marks in the smoothed rocks of the Central Park—or while that ice was melting away. Thus, in our survey of the conditions of life when man first appeared in Europe, India, and North America, we see that the animal life was in the same stage of evolution, and that "the old order" was yielding place "unto the new" in these three regions so widely removed from each other. The river-drift hunter is proved by his surroundings to belong to the Pleistocene age in all three.

It remains for us to weave the scattered threads of the inquiry into general conclusions. The identity of the implements proves that the river-drift hunter was in the same rude state of civilization, if it can be called civilization, in the Old and New worlds, while the hand of the geological clock pointed to the same hour. It is not a little strange that his mode of life should have been the same in the lands bordering on the Mediterranean, in the tropical forests of India, and on both sides of the Atlantic. The hunter of the reindeer in the valley of the Delaware was the same kind of savage as the hunter of the reindeer on the banks of the Thames or the Seine. It does not, however, follow that this identity of implements implies that the same race of men ranged over this vast tract. While this may be left an open question, it certainly indicates a primeval condition of savagery, from which mankind has emerged in the long ages that separate it from our own time. We may also infer from his wide range that the river-drift hunter (assuming that mankind sprang from one center) inhabited the earth for a long time, and that his dispersal took place before the glacial submergence and the lowering of the temperature in northern Europe, Asia, and America. It is not reasonable to suppose that the Straits of Behring could have offered a free passage either to the rivef-drift man migrating from Asia to America, or to the American animals from America to Europe, while there was a great barrier of ice, or of sea, or of both, in the high northern latitudes.

It will naturally be asked who and what was the river-drift hunter. The question can only be partially answered in the present stage of the inquiry. The few fragments of human bones, beyond doubt associated with the implements, are too imperfect to offer any evidence as to race. They, however, point out unmistakably that he was a man, and not "a missing link," and that he was without traces of Simian ancestry, such as have been ascribed to him by Mortillet and others. On this important point I entirely agree with Dr. Virchow. The river-drift man has vanished from the face of the earth without leaving any clew to his identification with any living race. After him the race of cave-men appeared in Europe, now represented by the Eskimos.

We may realize before the rock-hewn tombs at Luxor the impossibility of measuring the date of the river-drift hunter in terms of years. In the interval between the time of his encampment on the site of ancient Thebes and the rise of the splendor of Egypt, the conditions of life described in the preceding pages passed away, and man had progressed from the hunter stage of civilization into that of the Neolithic, of the Bronze, and of the Iron ages. He stands on the other side of an abyss of past time, the depth of which has not been, and which in my opinion cannot be, fathomed.

W. BOYD DAWKINS.